IN THE CLAIMS:

Please amend the claims as follows.

The listing of claims below will replace all prior versions, and listings, of claims in the application.

LISTING OF THE CLAIMS

1. (Original) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

a) placing the substrate in an environment for treatment;

b) dehydrating a surface of the substrate;

c) evacuating the environment;

d) introducing a silicon hydride gas into the treatment environment to contact the substrate;

e) heating the silicon hydride gas prior to, during or after the introduction of silicon hydride gas into the treatment environment;

f) pressurizing the silicon hydride gas in the treatment environment;

g) depositing a layer of silicon on a surface of the substrate;

h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;

i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;

j) purging the treatment environment with an inert gas to remove the silicon hydride gas;

k) cycling the substrate through steps c) through j) for at least one cycle;

l) evacuating the treatment environment; and,

m) cooling the substrate to room temperature.

2. (Original) The method of claim 1, wherein the lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C.

3. (Original) The method of claim 1, wherein the period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes.

4. (Original) The method of claim 2, wherein the period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes.

5. (Original) The method of claim 1, wherein the range of temperatures to which the substrate is cooled and the duration of time period for which the substrate is maintained at a lower temperature are optimized to optimize the surface properties.

6. (Original) The method recited in claim 1, said dehydration step comprising heating the substrate to a temperature in the range of from about 20°C to 600°C for a duration of from about 10 to 240 minutes.

7. (Original) The method recited in claim 6, including the step of heating the substrate in an inert gas along with purging of the gas or applying a vacuum, or both.

8. (Previously amended) The method recited in claim 1, said silicon hydride gas being selected from the group consisting of SiH_4 and Si_nH_{n+2}.

9. (Original) The method recited in claim 1, said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature.

10. (Original) The method recited in claim 9, said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C.

11. (Original) The method recited in claim 1, said silicon hydride gas being pressurized to a pressure in the range of from about 0.1 torr to 2500 torr.

12. (Original) The method recited in claim 1, said layer of silicon being deposited on the substrate for a period in the range of from about 1 to 480 minutes.

13. (Original) The method recited in claim 1, wherein the substrate is cycled through steps a) through j) to optimize the substrate performance in a vacuum atmosphere.

14. (Original) The method recited in claim 1, wherein the substrate is cycled through steps a) through j) to optimize the substrate performance against the undesirable effects of a corrosive substance.

15. (Original) The method recited in claim 1, wherein the substrate is cycled through steps a) through j) to result in from 1 to 10 layers of silicon being deposited on said substrate surface.

16. (Original) The method recited in claim 14, wherein the substrate is cycled through steps a) through j) to result in from 1 to 10 layers of silicon being deposited on said substrate surface.

17. (Original) The method recited in claim 13, wherein the substrate is cycled through steps a) through j) to result in 6 layers of silicon being deposited on said substrate surface.

18. (Original) The method recited in claim 14, wherein the substrate is cycled through steps a) through j) to result in 6 layers of silicon being deposited on said substrate surface.

19. (Cancelled)

20. (Cancelled)

21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Cancelled)

25. (Cancelled)

26. (Cancelled)

27. (Cancelled)

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled)

32. (Previously amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

a) placing the substrate in an environment for treatment;

b) dehydrating the surface of the substrate;

c) evacuating treatment the environment;

d) introducing a silicon hydride gas into the treatment environment to contact the substrate;

e) heating the silicon hydride gas in the treatment environment;

f) pressurizing the silicon hydride gas in the treatment environment;

g) depositing a layer of silicon on a surface of the substrate;

h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;

i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;

j) purging the treatment environment with an inert gas to remove the silicon hydride gas;

k) cycling the substrate through steps c) through j) for at least one cycle;

l) evacuating the treatment environment; and,

m) cooling the substrate to room temperature; said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;

said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;

said dehydration step comprising heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;

including the step of heating the substrate in an inert gas or in a vacuum;

said silicon hydride gas being selected from the group consisting of SiH_4 and Si_nH_{n+2};

said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;

said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C;

said silicon hydride gas being pressurized to a pressure in the range of from about 0.1 torr to 2500 torr;

said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.

33. (Original) The method recited in claim 1, said silicon hydride gas being pressurized to a pressure in the range of from about 1×10^{-7} to 2500 torr.

34. (Original) The method recited in claim 1, said silicon hydride gas being pressurized to a pressure in the range of from about 100 to 250 torr.

35. (Previously amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

a) placing the substrate in an environment for treatment;

b) dehydrating the surface of the substrate;

c) evacuating treatment the environment;

d) introducing a silicon hydride gas into the treatment environment to contact the substrate;

e) heating the silicon hydride gas in the treatment environment;

f) pressurizing the silicon hydride gas in the treatment environment;

g) depositing a layer of silicon on a surface of the substrate;

h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;

i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;

j) purging the treatment environment with an inert gas to remove the silicon hydride gas;

k) cycling the substrate through steps c) through j) for at least one cycle;

l) evacuating the treatment environment; and,

m) cooling the substrate to room temperature; said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;

said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;

said dehydration step comprising heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;

including the step of heating the substrate in an inert gas or in a vacuum;

said silicon hydride gas being selected from the group consisting of SiH_4 and Si_nH_{n+2};

said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;

said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C;

said silicon hydride gas being pressurized to a pressure in the range of from about 1×10^{-7} torr to 2500 torr;

said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.

36. (Previously amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

a) placing the substrate in an environment for treatment;

b) dehydrating the surface of the substrate;

c) evacuating treatment the environment;

d) introducing a silicon hydride gas into the treatment environment to contact the substrate;

e) heating the silicon hydride gas in the treatment environment;

f) pressurizing the silicon hydride gas in the treatment environment;

g) depositing a layer of silicon on a surface of the substrate;

h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;

i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;

j) purging the treatment environment with an inert gas to remove the silicon hydride gas;

k) cycling the substrate through steps c) through j) for at least one cycle;

l) evacuating the treatment environment; and,

m) cooling the substrate to room temperature; said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;

said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;

said dehydration step comprising heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;

including the step of heating the substrate in an inert gas or in a vacuum;

said silicon hydride gas being selected from the group consisting of SiH_4 and Si_nH_{n+2};

said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;

said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C;

said silicon hydride gas being pressurized to a pressure in the range of from about 100 torr to 250 torr;

said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.